

REMARKS

Reconsideration and withdrawal of the rejections set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1-3, 5-9, 11-18 and 20-24 are now pending in the application, with Claims 1, 6, 7 and 16 being independent. Claims 1, 6, 7 and 16 have been amended.

Claims 1-3, 5, 6, 16-18 and 20-24 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Davis et al. (U.S. Patent No. 5,695,820) in view of Matzinger (U.S. Patent No. 6,020,397). Claims 7-9 and 11-15 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Takemoto (U.S. Patent No. 6,341,854) in view of Matzinger. These rejections are respectfully traversed.

Applicants' invention as recited in Claim 1 is directed to a reaction solution for use in image recording in conjunction with an ink containing a coloring material in a dissolved or dispersed state, the reaction solution destabilizing the dissolved or dispersed state of the coloring material in the ink by contact with the ink. The reaction solution includes a polyvalent metal ion, an organic solvent, a buffer, and a metal ion derived from the buffer. The reaction solution has a pH of 2 or higher, and has a buffering action for variations in pH. The buffering action means maintaining pH variation within the range of 0.5 before and after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution. The present invention also relates to a set of an ink and a reaction solution (Claim 6), an inkjet recording apparatus (Claim 7), and an image recording method (Claim 16) using a reaction solution of comparable scope.

The reaction solution as recited in Claims 1, 6, 7 and 16 can have a pH that is very stable from the start and throughout prolonged usage. As a result, high quality images of high density and high color development, without strike-through of the coloring material to the back of the recording medium, can be obtained reliably. Moreover, as disclosed, for example at page 8, lines 7-12 of Applicants' specification, the metal ion derived from the metal salt buffer contributes to the destabilization of the coloring material to achieve a high density that is not obtainable by the mere use of a multivalent metal ion. Applicants submit that none of the cited references teach or suggest at least a reaction solution that can maintain pH variation within the range of 0.5 before and after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution.

Davis et al. is directed to a method for alleviating Marangoni flow-induced print defects in ink-jet printing. The method includes providing a primary ink-jet ink including at least one colorant and a vehicle, providing at least one treating solution capable of inducing precipitation of the colorant upon contact therewith, and printing the primary ink-jet ink and the treating solution sequentially onto a print medium in a stratified fashion such that the primary ink-jet ink and the treating solution are placed in contact with one another on the print medium.

In contrast to the Examiner's assertion at pages 2 and 5 of the Office Action, Applicants submit that Davis et al. does not teach or suggest a metal ion derived from a buffer. While column 8, lines 1-20 of Davis et al. describes buffers, none of the buffers contain metal ions. Moreover, since the buffer action of a salt can vary depending on the salt and its concentration as well as other ingredients, Applicants submit that Davis et al. does not teach or suggest the specific buffer action of the present invention.

As the Examiner admits, Davis et al. does not teach or suggest a reaction solution that can maintain pH variation within the range of 0.5 before and after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution. The Examiner, thus, cites to Matzinger for its disclosure of use of lithium hydroxide.

Matzinger is directed to a two-component ink jet system. One component is a polymer and the other component is an aziridine. The Examiner alleges that Matzinger teaches that to get the printed image of excellent quality that are wet-rub and accent marker resistant, the pH of the reaction solution and ink composition is controlled by the lithium hydroxide. Applicants submit, however, that in Matzinger, the lithium hydroxide is used for adjusting the initial pH of the reaction solution, not for providing a buffer action. Moreover, in the present invention, the lithium hydroxide is no more than a testing agent used for testing the extent of the buffer action. Accordingly, the reaction product of the present invention need not contain lithium hydroxide.

Moreover, while Matzinger does disclose that lithium acetate can be used as a buffer, Matzinger provides no teaching or suggestion for the preferable amount of the buffer to be used. Matzinger also does not provide any examples of the reaction solution actually containing a buffer, and all of the reaction solutions specifically disclosed apparently do not have the specific buffer action of the present invention. Accordingly, Matzinger does not teach or suggest at least a reaction solution that can maintain pH variation within the range of 0.5 before and after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution.

Takemoto is directed to an ink jet recording method using two liquids and an ink jet recording apparatus with the method. The two liquids are a reaction solution and

an ink composition. As the Examiner admits, however, Takemoto does not teach or suggest a reaction solution that can maintain pH variation within the range of 0.5 before or after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution. The Examiner cites to Matzinger for its disclosure, among other things, of use of lithium hydroxide. As discussed above, however, Applicants submit that Matzinger does not remedy this deficiency because Matzinger does not teach or suggest a reaction solution that can maintain pH variation within the range of 0.5 before and after the addition of 1.0 ml of a 0.1 N aqueous lithium hydroxide solution to 50 ml of the reaction solution.

Thus, Applicants submit that the proposed combinations of Davis et al. and Takemoto with Matzinger, even if proper, do not teach or suggest important features of the present invention recited in the independent claims. Accordingly, independent Claims 1, 6, 7 and 16 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1, 6, 7 and 16. Dependent Claims 2, 3, 5, 8, 9, 11-15, 17, 18 and 20-24 are also allowable, in their own right, for defining features of the present invention in addition to those recited in the independent claims. Individual consideration of the dependent claims is requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowability are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mark A. Williamson", written over a horizontal line.

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